Site 10 Salisbury Beach Reservation – Access Road

Overview: The Salisbury Beach Reservation – Access Road potential restoration site is located to the east of the access road approximately 0.25 mi south of Beach Road in Salisbury. The potential restoration site encompasses approximately 10 ac of tidal wetlands upstream of two existing culvert crossings under the access road which connect to Black Rock Creek. A third culvert under Beach Road ultimately extends to the Blackwater River to the north. Based on tide data recorded at the potential restoration site, this ditch appears largely blocked to the north. The access road was reportedly constructed in the early 1970's and the town-owned parking lot abutting the marsh to the east was originally constructed in the 1960's. The alignment of the access road was placed directly over the former creek just beyond the southern limit of the potential restoration area. The locations of two existing culverts under the access road were placed at the locations of two small historic creeks which extended into the potential restoration site. The long linear ditch which parallels the parking lot along with the long culvert under Beach Road was constructed more recently to reduce localized flooding. The access road along the restoration area is relatively high in elevation and consequently provides some flood control for low-lying properties to the east. Several homes near the southern end of the potential restoration site appear to be built on wetland fill following construction of the access road.

Tide gauge data collected in late May of 2005 documented a maximum restriction of approximately 2.0 ft during a large storm event on May 26th. However, the restriction is substantially reduced to approximately 0.3 ft during more typical spring tide conditions. Other evidence of a tidal restriction includes: scour pools downstream of the access road, extensive *Phragmites*, partially obstructed flow within the ditch just below the berm, and minor subsidence of the marsh plain.

Ownership of the restoration area includes DCR, the Town of Salisbury and private holdings. The Access road right-of-way is under the control of DCR.

Structure conditions: The first culvert under the access road (Culvert 1) is located approximately 1,200 ft south of Beach Road. Culvert 2 is located approximately 600 ft further south of Culvert 1. The access road is approximately 5.5 ft above the surrounding salt marsh and is in good condition. Culvert 1 is a 36 in CMP pipe with riprap outlet protection and is approximately 120 ft long. The downstream riprap is beginning to fail and is falling into the existing scour hole. The upstream pipe invert has advanced signs of corrosion and deterioration. Holes are present in the pipe, and a portion of the pipe has rusted away. The upstream creek showed signs of sediment buildup. Sanding operations at the municipal parking lot might be a contributing factor. Overall, Culvert 1 is in poor condition.

Culvert 2 is a 24 in CMP with riprap outlet protection and is approximately 110 ft long. The downstream invert has advanced signs of corrosion and deterioration. Holes are present in the pipe. Riprap around the downstream invert is stable but the adjacent bank is eroding away. The upstream invert and channel was severely blocked by debris and wrack. Overall Culvert 2 is also in poor condition. Currently, DCR has no plans to replace either culvert.

The replacement of the third culvert under Beach Road was not considered practical and therefore not closely inspected. This culvert is a 24 in RCP pipe and is approximately 280 ft in length. The ditch north of Beach Road is partially obstructed with accumulated sediment.

Ecological Integrity: The potential restoration site generally has a low level of ecological integrity. Portions of the potential restoration site are held in conservation by DCR. The area is

contained within BioMap Core Habitat and mapped as Priority Habitat for State-Protected Rare Species and Estimated Habitat for Rare Wildlife. Land uses are high density residential and commercial. The original salt marsh has been filled on all sides by residential development and road/parking lot construction. Approximately half of the remaining marsh is dominated by dense stands of *Phragmites*, which will likely further expand without control measures. The Phragmites are growing adjacent to existing development along Cable Avenue and represent a significant fire hazard.

The potential restoration site has a history of mosquito breeding problems. The Mosquito Control District completed some limited OWMM work within the southern portion of the potential restoration site and cleaned existing ditches approximately 5 years ago. They intentionally did not clear the ditch north of Beach Road due to possible concerns of aggravating flooding problems (W. Montgomery, Superintendent, NE MA MWMD). The District continues to hand treat portions of the potential restoration site for mosquito control. Much of the marsh is dominated by short-form S. alterniflora with saturated peat conditions. More aggressive ditching, including a series of perimeter ditches may help to control the spread of *Phragmites*. Runoff from the adjacent development, as well as sediment and non-point source pollution sources, are further impacting the integrity of the marsh. Two small pools within the marsh were the result of past OWMM efforts. The pools appear to be in good condition and were supporting a large fish population.

Intertidal habitat below the confluence of Allen Creek and Black Rock Creek is mapped as suitable habitat for soft shell clam and blue mussel.

Tide gauges were deployed in four locations including Black Rock Creek downstream of the two culverts under the access road, upstream of both these culverts and north of the Beach Road in the ditch which flows north toward the Blackwater River. Results of the tide gauge deployments show that both the north and south creek (Culverts 1 and 2) exhibit similar tidal fluctuations upstream of the culverts. Both creeks are fed by Black Rock Creek and show a significant restriction to tidal flow upstream of the culverts. These restrictions become more severe as the tidal prism in Black Rock Creek increases above 5 ft NGVD. There were 25 occurrences of tides above 5 ft out of the 29 tidal cycles recorded. There is a similar and consistent pattern of dampening and delay of the onset of high tide in both the north and south creek compared to Black Rock Creek. The highest tides in Black Rock Creek ranged from 6.9 – 8.7 ft NGVD. Corresponding high tides in the north and south creeks range from 5.3 – 6.6 ft NGVD. Resulting tidal restrictions range from 0.39 – 1.96 ft in the south creek and 0.34-2.09 ft in the north creek.

During these higher tidal events, the access road provided flood protection to low-lying properties along Cable Avenue. On May 26, 2005, during a major coastal storm, the highest tide of the deployment period in Black Rock Creek occurred at 2:03 AM with a maximum height, adjusted to the 1929 NGVD, of 8.7 ft. The maximum adjusted heights upstream of the culverts in the north and south creeks were 6.61 ft at 4:02 AM and 6.74 ft at 3:54 AM respectively. The resulting tidal dampening was 2.09 ft in the north creek and 1.96 ft in the south creek with delays of 1 hr 59 min in the north creek and 1 hr 51 min in the south creek. The maximum dampening is less than 11% of total tidal prism recorded at the downstream gauge (the downstream gauge was not able to capture the entire tidal prism).

During more typical spring tides, of approximately 5.5 ft NGVD, the resulting tide damping is approximately 0.3 ft. Measured salinities at the time of gauge deployment were 10.7 ppt in Black Rock Creek, 10.1 ppt in the south creek and 7.4 ppt in the north creek upstream of the culverts. The north creek is also open to the Great Meadows Marsh system under Beach Road. On the

majority of dates during the deployment period, the height of the water at high tide in the north creek was greater and occurred earlier than that in the Great Meadows creek. Measured salinity in this creek was 11.1 ppt. While there are significant tidal restrictions due to the culverts in both the north and south creeks relative to Black Rock Creek, the north creek does not appear to be significantly influenced by the Great Meadows Marsh system to the north.

Overall, the existing impairments are considered severe. Replacing the existing culverts under the access road with larger structures set lower in the channel would reduce the tidal restriction, the observed bank erosion, and the impounded channel conditions. The increased tidal exchange along with additional ditch work on the marsh would help limit the expansion of the populations of *Phragmites* and allow the marsh plain to increase in elevation in response to rises in sea level. Major impacts to abutting developed lands are anticipated without appropriate mitigating measures such as self regulating tide gates (SRTs).

Socioeconomic: Recreational values of the potential restoration site are somewhat enhanced by the public access and wildlife viewing opportunities provided within the Reservation. The partial public ownership status, reasonably good access, and level of visitation enhance educational opportunities. There is no known ongoing research associated with this marsh. The potential restoration site's Uniqueness/Heritage value is enhanced by its status as a Priority Habitat for State-Protected Rare Species and Estimated Habitat for Rare Wildlife. The potential restoration site does not include any known cultural resource elements.

Construction Logistics/Feasibility: Constructability at this potential restoration site is considered medium. The poor condition of the existing culverts does provide an opportunity to replace them with larger pipes. However; increased tidal flow would adversely impact adjacent low-lying properties as well as low portions of the municipal parking lot without appropriate mitigation. With properly designed SRTs on new culverts, flow could be slightly enhanced during typical spring tides below elevation 5.5 ft NGVD while providing enhanced flood control during higher tides. Water levels above this elevation begin to encroach onto the municipal parking lot and several lawns along Atlantic Avenue. Buildings are impacted when water levels reach approximately 6.0 ft NGVD. The municipal parking lot includes areas as low as 5.0 ft NGVD. The reduced flood elevations may also benefit low-lying properties to the north of Beach Road. Effective restoration would also need to include substantial ditch cutting/maintenance and possibly additional OMWM work.

There is ample area along the access road for construction staging and material stockpiling. Low traffic volumes during off-peak seasons would likely allow for a road closure. There are no known utilities impacted by the construction. Given the limited existing tidal restriction, it may not be necessary to replace both culverts, however we have assumed costs associated with replacing both and outfitting the downstream ends with SRTs. Costs also assume substantial ditching efforts on the marsh plain. The total construction costs associated with this project are estimated to be $650,000. The current level of support for the project is unknown at this time.

Restoration Potential: The site is considered to have moderate restoration potential which is increased by the public heath issues associated with known mosquito breeding, fire concerns associated with the stands of *Phragmites* adjacent to residential properties, and the potential to improve both ecological impairments and existing flooding problems. Proximity to the Reservation provides excellent opportunities for public outreach and education. These benefits need to be weighted against the relatively high costs of the restoration due in part to the complexities of the flooding problems. Key steps toward implementation involve further

coordination with the Town, DCR, and the Mosquito Management District to gauge the level of support and timing of necessary capital improvements due to the condition of the culverts.

Site # 010 | Site Features | Scale: 1:3,000

Photo 1 - Low Lying Properties along Cable Street

Photo 2 - Northern Portion of Site 10

Photo 3 - Downstream View of Southern Culvert Under Access Road

Photo 4 - Downstream View of Northern Culvert Under Access Road

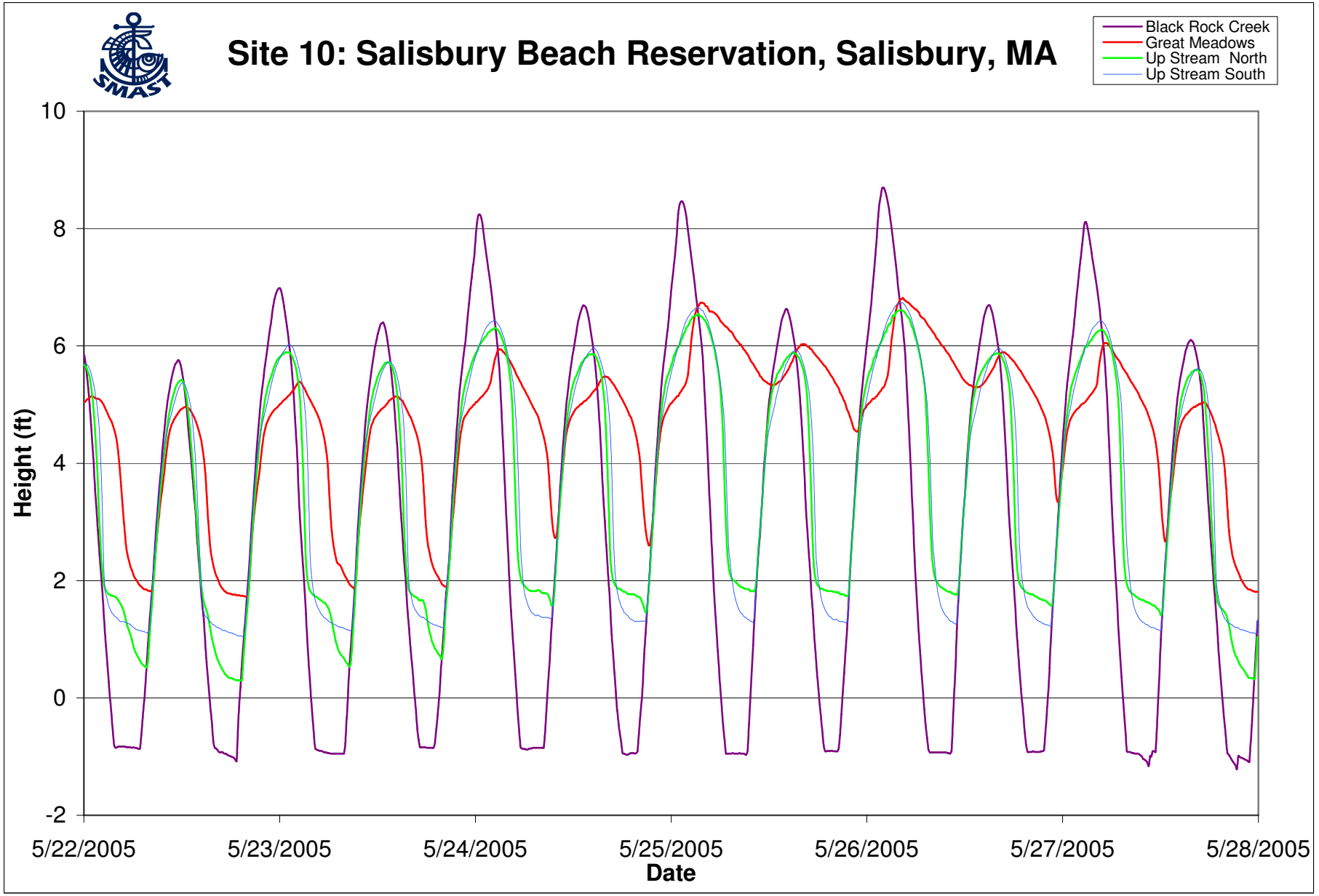
Photo 5 - Salt Panne within Site 10

Photo 6 - Interior Portion of Site 10

Photo 7 - Upstream View of Culvert Under Beach Road

Photo 8 - Creek North of Beach Road Viewing North

Photo 9 - Low Lying Area of Municipal Parking Lot


Site 10: Salisbury Beach Reservation, Salisbury, MA
Black Rock Creek
Great Meadows
Up Stream North
Up Stream South
Height (ft)
10
8
6
4
2
0
-2
5/22/2005
5/23/2005
5/24/2005
5/25/2005
5/26/2005
5/27/2005
5/28/2005
Date

Great Marsh Coastal Wetlands Restoration Planning

Rapid Field Assessment

Site # 10

Salisbury Beach Reservation - Access Road

Site Information

Site ID:	10
Site Name:	Salisbury Beach Reservation - Access Road
Municipality	Salisbury
Location:	East of access road, 0.25 mi south of intersection with Route 1A (Beach Road)
Adjacent Waterbody:	Merrimack River

Affected Area (Acres)

Mudflat/Open Water:	0	Total Area:	10.3
Salt Marsh:	10.3		
Other Wetland:	0	*Other Description:*	
Other:	0		

Impairment(s)

Tidal Restriction	☑	Fill	☑
Obstructed Ditche(s)	☑	Invasive Species	☑
Impoundment	☐	Pollution / Siltation	☑

Severity of Impairments: Severe

Project Type

Roadway Culvert(s)	☑	Obstructed Ditches	☑
Bridge	☐	Fill	☐
Berm	☐	Other	

Evidence of Restriction

Gauge Data	☑	Impounded Flow	☐
Downstream Scour Pool	☑	Obstructed Flow	☑
Upstream Scour Pool	☐	Invasive Species	☑
Bank Erosion	☑	Ponded Conditions	☐
Slumping	☐	Subsidence	☑

Structure / Channel:

Overall Condition:	Poor
Life Expectancy (Years):	5
Road Condition:	Good
Structure Type:	CMP culverts
Structure Age (Years)	35
Structure 1 Width (Feet):	3
Structure 1 Length (Feet):	120
Structure 2 Width (Feet):	24
Structure 2 Length (Feet):	110
Skew (Degrees):	20
Cover (Feet):	5.5
Scour Protectection:	☑
Adequately Aligned:	☑
Headwall Type:	None
Headwalll Condition:	None

Ecological Integrity / Habitat Value

Surrounding Land Use %

Commercial / Industrial	30
Residential	50
Agricultural	0
Undeveloped	20

Severity of Impairment(s)	Severe
Invasive Plant Cover:	High
Extent of Wooded Buffer:	Poor
Habitat Connectivity:	Poor
NHESP Estimated Habitats of Rare Wildlife:	☑
NHESP Priority Habitats of Rare Species:	☑
NHESP BioMap Core Habitat:	☑
NHESP BioMap Supporting Natural Landscape:	☐
ACEC:	☐
Anadromous Fish:	☐
Shellfishing Suitability:	☑
Barriers to Fish Passage	Minimal

Great Marsh Coastal Wetlands Restoration Planning

Rapid Field Assessment

Site # 10

Salisbury Beach Reservation - Access Road

Construction Logistics / Feasibility

Traffic Volume	Low
Detour Potential	☑
Site Access	Good
Staging Areas	☑
Fill Material Concern	Minimal
Low Lying Property Concerns	Severe
Overhead Utility Constraint	None

Underground Utilities

Water	☐	*Telephone*	☐
Gas	☐	*Sewer*	☐
Electric	☐	*Drainage*	☐

Permitting Complexity	Medium
Local Support	Unknown
Feasibility Cost	30,000
Design Cost	40,000
Permitting Cost	25,000
Construction Cost	650,000
Total Cost	745,000
Relative Cost/Acre	72,000

Socioeconomic

Recreation

Public Access:	☑
Watercraft / Portage:	☐
Wildlife Viewing:	☑

Education

Schools Nearby:	☐
Ongoing Research:	☐
Education / Outreach Potential:	High
Saftey Concerns (Access):	Low

Uniqueness / Heritage Value

Rare Species Habitat:	☑
ACEC:	☐
Cultural Resource Features	☐
Urban Viewscape Value:	None
Urban Habitat Value:	None

Tide Surveys

	Start:		*Finish:*
Dates of 1st Survey:	5/18/2005	-	6/2/2005
Date of Highest Tide:	5/26/2005		
Max Measured Tidal Dampening:	2.09 ft		
Percent of Tidal Prism:	11		
Measured Delay:	1 hr 59 min		

	Start:		*Finish:*
Dates of 2nd Survey:		-	
Date of Highest Tide:			
Max Measured Tidal Dampening:			
Percent of Tidal Prism:			
Measured Delay:			

Summary

Uniqueness / Heritage Value:	Medium	Ecological Integrity:	Low
Recreational Value:	High	Logistics / Feasibility:	Medium
Educational Value:	High		

Restoration Potential: Moderate